DEPARTMENT OF PESTICIDE REGULATION
PESTICIDE REGISTRATION AND EVALUATION COMMITTEE
Meeting Minutes – August 19, 2005
(Amended)

Committee Members/Alternates in Attendance:

Anna Fan, Office of Environmental Health Hazard Assessment (OEHHA)
Barbara J. Todd, Department of Food and Agriculture (CDFA)
Syed Ali, State Water Resources Control Board (SWRCB)
Bryan Eya, Department of Toxic Substance Control (DTSC)
Lynn Baker, Air Resources Board (ARB)
Barry Wilson, University of California Department of Environmental Toxicology (UCD)
Ray Chavira, U.S. Environmental Protection Agency, Reg. 9 (USEPA)
Rebecca Sisco, University of California IR-4 Program
Tobi Jones, Department of Pesticide Regulation (DPR)

Visitors in Attendance:

Betsy Peterson, California Seed Assn.
Eileen Mahoney, DPR
Joyce Gee, DPR
Dave Rice, OEHHA
Kevin Keefer, WPHA
Carolyn Lewis, DPR
Wynetta Kollman, DPR
Brian Bret, Dow Agro Sciences
Ruby Reed, DPR
Peter Matthews, SRP, Admin Support

1. Introductions and Committee Business – Tobi Jones, Chairperson

   a. About 19 people attended the meeting.
   b. Corrections to the minutes of the previous meeting held on May 20, 2005 were identified, and the minutes will be amended.

2. Toxic Air Contaminant Workshop (Methidathion) – Parakrama Gurusinghe, Environmental Monitoring Branch, Sheryl Beauvais, Worker Health and Safety Branch, and Carolyn Lewis, Medical Toxicology Branch

Chair Jones introduced this agenda item. This discussion satisfies the Toxic Air Contaminant Act requirement for a public meeting to discuss the risk assessment on methidathion, focusing on ambient air exposure.

Environmental Fate and Use

Dr. Gurusinghe presented information on the environmental fate of methidathion under three broad headings: physical and chemical properties, application and use in California, and its fate in the environment. Methidathion belongs to the Organophosphorus group and thiadizole sub group. For physical/chemical properties, methidathion is sparingly soluble in water, but readily soluble in standard organic solvents. It has low Henry's Law Constant (1.95×10^{-9} atm-m^3-mol), and Octanol-water Partition Coefficient (K_{ow}) of 166. Methidathion's application and use is governed by its designation as a restricted use material. It has a contact mode of action and has three registered products in use in California. Two of the products have the signal word "Danger", which trigger several worker health and safety requirements. Methidathion is recommended on a variety of crops to control cutting and chewing insects. The rates vary from 0.25 to 5.0 lbs per acre, where citrus has the highest rate recommendation. Methidathion use is characterized through the Pesticide Use Report. Methidathion use has been drastically reduced from its highest use of 370K pounds in 1994, to little over 50K pounds in 2003. Methidathion use in 1991, the year of a monitoring study, was around 330K pounds. Gurusinghe showed the use of methidathion broken down by county, month, and commodity, and compared the use of 1991 with the reported use as of 2003. Central/San Joaquin valley counties still use most of the pesticide. The use pattern showed a bi-modal distribution, a winter-dormant application peak and a summer crop application peak. Almonds and oranges were the biggest users in 1991; the positions were reversed in 2003.

Mehtidathion is hydrolyzed slowly (approximately 40 days half life) in acidic to neutral aquatic environments, but as the alkalinity increases, breakdown becomes very rapid. The effect of temperature is dramatic, and at 20 ^{0}C, and pH 1, the half-life was 41.3 days, but when the temperature increases to 50 ^{0}C, it is broken down in 0.8 days. Then as the pH increases, the same pattern is seen. Biological factors predominate soil-fate, and under aerobic conditions, in 3 days methidathion is reduced to half of its original weight. Under anaerobic conditions it takes around 30 days. No direct data are available on the atmospheric chemistry of methidathion. However, it has been shown that the OH^- in the air reacts with methidathion. A modeling program (AOPWIN™) has estimated a Rate Constant of 149.8×10^{-12}, and a corresponding half-life value of 0.07 days. In an ambient air monitoring study done in summer, 1994, methidathion and its breakdown product methidaoxon were detected in Lindcove and Ash Mountain and only methidaoxon at Kaweah, a high elevation study site (all east of Fresno) (Aston & Seiber, 1997). At the request of DPR, the ARB conducted an air monitoring study in the summer of 1991 in Tulare County to gather data on methidathion in the air, in and around communities where this pesticide is applied frequently (Royec et al, 1993). Of the four monitoring sites, Jefferson School, Lindsay site tested positive to methidathion in 6 of the 17 samples. In all, 7 samples

were positive out of 81 total samples, collected from June 27, to July 25, 1991. A positive detection of 4 out of 84 for methidaoxon was observed as well. This study also included an investigation on the presence of methidathion and methidaoxon during and soon after a field application of methidathion to an orange grove. Both compounds were detected during a seven recording intervals and three sampling locations.

Discussion followed clarifying that more detailed data is available in the draft assessment, and that the scope of the risk assessment being focused on human health.

Exposure Estimates
Dr. Sheryl Beauvais presented DPR's estimates for exposures of the public to methidathion in ambient air and exposures of bystanders during applications, and explained how they were calculated based on air monitoring conducted in 1991. Ambient air exposure estimates were estimated from methidathion concentrations at the ambient monitoring site having the highest concentrations. Acute absorbed daily dosages (Acute ADD) for ambient air exposures in Tulare County were 0.389 µg/kg/day for infants and 0.185 µg/kg/day for adults. Seasonal ADD were 0.047 and 0.022 µg/kg/day for infants and adults, respectively. Annual ADD were 0.035 µg/kg/day for infants and 0.017 µg/kg/day for adults.

Bystander exposure estimates were based on air monitoring done 15 - 150 m from the edge of a Tulare County orange grove during an application. Estimates were not adjusted to reflect that maximum concentrations were likely not captured during the application due to changing wind directions and only three sampling stations, nor for the fact that the application rate used in this study was below the maximum. Acute ADD for bystanders were 0.519 µg/kg/day for infants and 0.246 µg/kg/day for adults. Seasonal and annual exposures for bystanders were not estimated, because relatively few applications have been done in recent years (a total of 1,207 applications were made in the entire state in 2003) and airborne concentrations are anticipated to reach ambient levels within a few days after each application.

Exposure estimates did not include methidaoxon, because of interferences documented in laboratory blanks and spikes. However, in reviewing the exposure assessment, ARB suggested that methidaoxon concentrations be included in exposure estimates. DPR is considering ARB's suggestion, and may change exposure estimates after the public comment period. Bystander exposure estimates may also be modified to approximate downwind concentrations that would occur during an application with the maximum rate.

Committee members provided comments on the assumption that bystanders would not be subjected to seasonal and annual exposures, and suggested ways to support or refute the assumption. DPR will incorporate these suggestions into the exposure assessment.

Human Health Assessment

Carolyn Lewis discussed the toxicity of methidathion and the calculation of risks. The primary mechanism of toxicity with exposure to methidathion is inhibition of the enzyme, acetylcholinesterase, that is found in the central and peripheral nervous system. This enzyme is involved in neurotransmission. Inhibition of cholinesterase (ChE) was the most sensitive endpoint with acute and subchronic exposure to methidathion. With chronic exposure, liver toxicity was also one of the more sensitive endpoints. The No Observed Effect Level (NOEL) selected for evaluating acute exposure to methidathion was 0.3 mg/kg based on brain ChE inhibition in male rats in an acute neurotoxicity study. The lowest NOEL with subchronic exposure to methidathion was 0.2 mg/kg/day based on the blood and brain ChE inhibition in rats in a subchronic neurotoxicity study. The lowest NOEL with chronic exposure was 0.15 mg/kg/day based on liver toxicity in dogs. Increased liver tumors were seen in male mice. Although the development of these tumors may be related to liver toxicity, there was insufficient data to support this non-genotoxic mechanism of toxicity. In addition, the genotoxicity data was mixed. Therefore, DPR calculated a cancer potency factor for methidathion using a linearized extrapolation model. The estimated cancer potency ranged from 0.34 to 0.53 $(mg/kg/day)^{-1}$. While the developmental and reproductive toxicity studies did not indicate any increased sensitivity in infants and children, a direct dosing study with weanling and adult rats suggests that weanling rats are about 2-fold more sensitive based on their LD_{50} values. However, this 2-fold increase in sensitivity may be within the standard 10-fold variation in sensitivity that is normally assumed for the human population.

The risks for non-carcinogenic health effects in humans is expressed as the margin of exposure (MOE) which is the ratio of the NOEL from the animal studies to the human exposure dosage. Generally, an MOE greater than100 is desirable assuming humans are 10 times more sensitive than animals and there is a 10-fold variation in the sensitivity of the human population. The criteria for listing a pesticide as a toxic air contaminant (TAC) is the MOE less than 1,000. Using the human exposure dosages estimated from the application site and ambient air monitoring that was conducted in Tulare County in 1991, the acute MOEs were greater than 1,000 for adults. The MOEs for infants were greater than 100, but less than 1,000 for infants, triggering the listing as a TAC. The seasonal and chronic MOEs were all greater than 1,000. The risk for cancer is calculated by multiplying the cancer potency by the human exposure dosage. A risk less than one in a million or 10^{-6} is generally considered negligible. The criteria for listing a pesticide as a TAC is the risk is greater than one in 10 million or 10^{-7}. The risk estimates at the Jefferson site ranged from 5.8 to 9.0 x 10^{-6}. These estimates are greater than 10^{-7}, thus triggering the listing of methidathion as a TAC. The reference concentrations for acute, seasonal, chronic and cancer endpoints were 5.1 $\mu g/m^3$ (0.41 ppb), 3.4 $\mu g/m^3$ (0.27 ppb), 2.5 $\mu g/m^3$ (0.21 ppb), and 6.8 ng/m^3 (0.5 ppt), respectively.

Committee members provided comments about inclusion of the oxon in the acute MOE, and the importance of assessing the validity of certain rat and dog studies where red blood cell ChE is assessed. Consideration of these comments will be made in preparing a final draft.

Jones indicated that the risk assessment is available for public comment until September 26, and members are welcome to provide us any additional comments. Randy Segawa explained what happens after a pesticide active ingredient is listed as a Toxic Air Contaminant.

3. Update on Pesticide Misters: National Discussion – Tobi Jones, DPR

Chair Jones referenced the past query about pesticide mister units available in retail stores and concern for pesticide exposure. She provided two documents to the committee as information items: a 2000 Morbidity and Mortality report on illnesses associated with pesticide misting devices, and an issue paper concerning misting devices marketed to home owners, prepared in the State FIFRA Issues Research Evaluation Group (SFIREG), a states' pesticide regulatory forum, and forwarded to U.S. EPA Office of Pesticide Programs. The issue paper identifies a number of concerns about these devices.

There was discussion about exposure concerns if other types of active ingredients were used. Ray Chavira discussed his query with U.S.EPA headquarters, their attention to this issue and consideration of approaches on how to address. Ray indicated he expects a decision shortly on the direction to be taken, and that there is likely to be a stakeholder meeting on the issue.

4. Agenda Items for Next Meeting– Tobi Jones, DPR
   The next meeting will be held on Friday, September 16, 2005 in the Sierra Hearing Room located on the second floor of the Cal/EPA building.

5. Closing Comments – Tobi Jones

   The meeting was adjourned.